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Fujiki et al.

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(54) **OPTICALLY ACTIVE POLYTHIOPHENES**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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(58) **Field of Search** 528/380; 526/256; 549/59, 80, 83, 86

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

JP 10-048678 2/1998

OTHER PUBLICATIONS

Fujiki et al., *Polymer Preprints*, 40(1), pp. 523–524, (1999).
Kotkar et al., *Frontiers of Polymer Research*, pp. 407–411, (1991).
Kotkar et al., *Journal Chemical Society Chemical Communications*, pp. 917–918, (1988).

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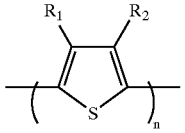
(57) **ABSTRACT**

Novel polythiophenes which exhibit strong main chain absorption in the ultraviolet to visible region, show optical activity depending on the polymeric chain alone, and comprise as repeating units thiophene rings containing chiral substituent groups, and are represented by the following general formula:



(wherein R_1 and R_2 are the same or different, each representing a hydrogen atom or an organic group, of which at least one is an enantiopure alkyl group with a branch structure at the β-position, and n represents the number of repeating units selected from 10 to 100,000).

8 Claims, 9 Drawing Sheets